

## Component of Trust for Developing Crowdwork System: A Systematic Literature Review

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### ABSTRACT

Crowdwork is a system that brings job providers and crowdworkers in a portal. Nowadays, many companies are turning to freelancing rather than hiring full-time employees. In addition, the workers have also switched to working as freelancers. New problems also arise in the crowdwork system. Trust is one of the main issues that arise in the crowdwork system. It happens because the job providers and workers do not meet each other on the crowdwork portal. This research aims to examine the components that affect trust in a crowdwork system. The benefit is that stakeholders can be aware of how to increase trust in the crowdwork system. The method used in this research is systematic literature review, by analyzing Scopus based journals related to trust in the crowdwork system. This research produces 11 components and 38 indicators. There are three components that needs concern to stakeholders who want to take advantage of crowdwork systems and focus on trust. These components are reciprocal voting, monetary reward, and cognitive effort. The platform should enable stakeholders to have reciprocal voting, less cognitive effort, as well as clean and clear monetary reward procedure.

## 1. Introduction

Crowdwork system is a portal that allows employers to find workers on a project-based online basis. Crowdworking is a socio-technical work system formed through a series of relationships that connect organizations, individuals, technology and work activities. Online crowdwork takes place in the online marketplace which allows companies to find workers and supports workers in finding work [1]. Through online crowdwork, workers will carry out performance activities through distributed crowdworkers and be financially funded by job providers (can be individuals, groups, or organizations). Crowdworking uses internet technology to answer the needs of the workforce digitally [2]. Crowdworking initially emerged using well-known concepts such as sharing economy and collaborative consumption. Crowdworking is an option to hire labor.

Freelancing is greatly helped by the crowdworking platform system. Crowdworking is growing nowadays and starting to be glimpsed by workers. Crowdworking can provide opportunities to be able to work flexibly through digital platforms. A survey shows

that there are almost five million crowdworker workers in the UK [3]. 18% of Netherlands citizen have tried to find work through platforms digital [4]. Around 12% of the Swedish population work as gig workers [5]. According to Indonesian Central Statistics Agency (BPS) at the end of 2018, as many as 56.8% of Indonesians worked in the informal sector, which is accompanied by an increase in the number of workers who are entrepreneurs in Indonesia, including freelancers. In May 2019, there are 129.36 million workforces in Indonesia. Freelance took 4.55% or around 5.89 million people. This number increased 16% from 2018 (data is gained from Sribulancer, one of the Freelance Indonesia service providers). This increase is due to the fact that crowdworking facilitates connectivity in the global workforce search network and enables rapid scalability [6]. From the employer side, crowdworking can also change fixed costs into variable costs for employee cost.

Trust often linked to the someone reputation in a system. User reputation is the only method to identify trust. There are various perspectives to estimate trust. Trust is one kind of sciences widely explored in computer science. Trust value can be measured through subjective opinion, whereas trust assessment can be

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calculated by combining user reputation with estimates from various sources [7]. Trust is also needed in the online labor system, such as crowdwork system.

The main problem related to trust in crowdwork system lies in the assessment of crowdworkers who are unfair, and the lack of transparency in the assessment given by the employer. This has an impact on job satisfaction and the continuous intention to participate in the crowdwork system. This is supported by Ye & Kankanhalli's research [8] which says that trust is an important factor in the participation of workers in a crowdwork system. Feller et al. [9] also said that trust is one of the critical factors in the success of crowdworking and it has an impact on worker participation. In an online environment, trust can encourage participation and can mediate the relationship between environmental conditions and subsequent participation [10,11]. Therefore, this research will identify component factor of trust for developing crowdwork systems especially online freelancing platforms using systematic literature review.

## 2. Theoretical Foundation

### 2.1. Crowdwork System

According to Howcroft and Kåreborn [12], crowdwork has 4 (four) typologies that are intended to answer future issue and challenge. It also help to understand the complex field of crowdwork. The purpose of typology is to reduce the complexity of various kinds of crowdwork.

#### 1. Online task

Online task crowdwork provide paid work (as the worker interest) for a specific task. Actors who initiate processes of this type are employers. The tasks are modular, ranging from micro work to more complex work.

#### 2. Playbour

'Playbour' (a combination of work and games) is based on unpaid work. 'Playbour' [13] is an ideological strategy that connects games, labor creativity, and autonomy [14]. This type of crowdwork is according to workers request. Workers have more sense to innovate. It also increase workers productivity, because there is no clear boundaries between work and pleasure.

#### 3. Asset-Based services

This type is a type of crowdwork that involves asset-based employment services. This category is closely related to the idea of sharing economy [15]. The tasks managed digitally, are mostly carried out offline and depend on the use of workers' assets.

#### 4. Profession-based freelance

This type is for professional-based freelance jobs. This type of crowdwork tends to have a more attention that needs high level skills and knowledge.

According to Kuek et al. [16], crowdwork can be divided into 2 types (microwork and online freelancing) which has differentiation in terms of size and complexity of the work. Kuek et al. explains, microwork refers to simple work and no need more time to accomplish. The worker doesn't need special skills. Online freelancing needs high level skills and experience in big projects. It also needs more time to complete task in online freelancing. The example of microwork is logo design, while the example of online

freelancing is system development project. More than 50% of online freelancers is bachelor's degree, while 33% of workers in microwork have them.

### 2.2. Trust

Trust is a major problem in the dynamics of group organizations, for example political and social organizations [17]. Trust is defined as an attribute carried out by people about the motives of group authority. If people have confidence in the authority of the group, it proves that the person cares about their needs. This authority group has genuine interests, cares about the person's way of thinking and point of view, and considers each person's opinion, and acts fairly to the person. Trust reflects the assessment that the motives of the authority are full of kindness and care. Groups that have authority are motivated to act in a way that considers the well-being of people in the group [18].

Dwyer and Oh [19] state that trust is the desire to achieve long-term goals. The biggest failure in building relationships between sellers and consumers is a lack of trust. There are two main topics of trust

- a. Trust in partner's honesty, related to trust in the honesty of partners / companies
- b. Trust in partner's benevolence, related to trust in the company's good intentions

## 3. Methodology

This research uses a systematic literature review method by analyzing research paper or literature related to component factor of trust to develop crowdwork system. The phases of this research are divided into several stages, such as: determining the source of research literature, determining the pattern of literature search keywords, determining the inclusion and exclusion criteria, extracting data, and analyzing findings to answer the research problem formulation.



Figure 1: Phases of Systematic Literature Review

Source: Adapted from Tranfield and Smart [20]

### A. Determine Source of Research Literature

In this initial stage, the research literature source will be determined to find research articles related to the topic. Research Literature Sources used include:

- a. SAGE
- b. Science Direct
- c. ACM Digital Library
- d. Springer

Keywords to search for research article papers use the Boolean operator in order to obtain the appropriate search results. Boolean operators used are OR and AND. The keywords used are:

- a. Trust AND (component OR Attribute) AND (framework OR model) AND (crowdwork OR crowdsourcing OR (crowdwork AND system) OR (crowdsourcing AND system))
- b. Trust AND (component OR Attribute) AND (framework OR model) AND (crowdwork OR crowdsourcing)

The inclusion criteria for searching research articles consist of three stages. The first stage is the “Studies Found” process. Search results according to keywords will be categorized as “Studies Found”. The next stage is “Candidate Studies”. If the title and abstract of the research article in studies are found match to the research topic, then it is categorized as “Candidate Studies”. The final stage of this research is “Selected Studies”. If the paper on “Candidate Studies” answers the research problem statement, it will be included in “Selected Studies”.

Exclusion criteria used in this study include:

- a. The research article paper used in this study has a publication year for the past five years.
- b. Research Paper has a complete writing structure, complete paper identities, and complete identity of the author.
- c. If duplication occurs, it will be excluded in this literature study.

**B. Data Extraction**

This study analyzed 622 papers included in the Founded Studies and derived from 4 sources of literature and in accordance with the inclusion and exclusion criteria that have been set. Paper included in the Founded Studies is then re-analyzed the suitability between the title, abstract, and the research question, so that obtained 35 papers included in Candidate Studies. The paper included in Candidate Studies was then re-analyzed by reading the entire paper content and found 8 papers included in Selected Studies. Here are the findings of the literature from various sources:

Table 1: Result of Data Extraction

| Source              | Found      | Candidate | Selected |
|---------------------|------------|-----------|----------|
| Sage                | 51         | 8         | 3        |
| Science Direct      | 392        | 15        | 3        |
| Springer            | 7          | 2         | 1        |
| ACM Digital Library | 172        | 10        | 1        |
| <b>Total</b>        | <b>622</b> | <b>35</b> | <b>8</b> |

**4. Results and Discussion**

This study aims to discover what components factors of trust that are needed to develop the Crowdsourcing System. This section will present demographic data and characteristic trends from the literature included in the Selected Studies category, such as publication sources, publication years, classification of trust component of crowdsourcing or crowdsourcing system components of the literature study. The following table shows the sources of journal publications consist of title, year, and type of publication. There are 7 journal papers used in this literature review. It can be concluded that crowdsourcing is more closely researched in the disciplines of strategic information systems and management.

There are 16 authors who have written 7 papers in total. The 16 authors are grouped into 8 departments. Authors who contribute research on trust component of crowdsourcing or crowdsourcing tend to write with research approaches. Most of them have academic background (87.5%, 14 authors) and 2

authors (12.5%) have industry background. The detailed of author name can be seen in table 3.

Table 2: Source of Literature and Paper Discipline

| No | Title  | Paper Discipline              | Source         | Year | Type    |
|----|--|-------------------------------|----------------|------|---------|
| 1  | Crowdsourcing-Based Business Models [21]       | Management                    | Sage           | 2015 | Journal |
| 2  | Combining User Reputation [22]                 | Data and Information Quality  | ACM            | 2016 | Journal |
| 3  | Community building on crowdwork [23]           | Political Economy             | Sage           | 2020 | Journal |
| 4  | The Future of Work: New Roles [24]             | Human Resources               | Sage           | 2018 | Journal |
| 5  | Developing and maintaining clients’ trust [25] | Strategic Information Systems | Science Direct | 2018 | Journal |
| 6  | Should You Really Produce [26]                 | Product Innovation Management | Springer       | 2017 | Journal |
| 7  | Solvers’ participation [27]                    | Strategic Information Systems | Science Direct | 2017 | Journal |

Table 3: Author’s Information

| Author                | Department                                 | Author's Background | # of Author's Publication |
|-----------------------|--|---------------------|---------------------------|
| Andreas Herrmann      | Business Administration, Law and Economics | Academic            | 1                         |
| Archana Nottamkandath | Computer Science                           | Academic            | 1                         |
| Atreyi Kankanhalli    | Computer Science                           | Academic            | 1                         |
| Christine Gerber      | Computer Science                           | Academic            | 1                         |

| Author                | Department   | Author's Background | # of Author's Publication |
|-----------------------|--|---------------------|---------------------------|
| Davide Ceolin         | Computer Science                                     | Academic            | 1                         |
| Hua (Jonathan) Ye     | Computer Science                                     | Academic            | 1                         |
| Ji-Ye Mao             | Management Science & Engineering                     | Academic            | 1                         |
| Kevin Freitas         | Human Resources                                      | Industry            | 1                         |
| Paul Groth            | Computer Science                                     | Academic            | 1                         |
| Reto Hofstetter       | Marketing and Communication Management               | Academic            | 1                         |
| Suleiman Aryobsei     | Management Business                                  | Industry            | 1                         |
| Thomas Kohler         | Law and Philosophy (Open Innovation & Crowdsourcing) | Academic            | 1                         |
| Valentina Maccatrozzo | Computer Science                                     | Academic            | 1                         |
| Wan Fokkink           | Computer Science                                     | Academic            | 1                         |
| Wenyu (Derek) Du      | Information Systems                                  | Academic            | 1                         |

| Institutions                               | # of papers | %    |
|--|-------------|------|
| Berlin Social Science Center               | 1           | 6.25 |
| Boston College Law School                  | 1           | 6.25 |
| Dream11                                    | 1           | 6.25 |
| Elsevier B.V.                              | 1           | 6.25 |
| National University of Singapore           | 1           | 6.25 |
| Netherlands eScience Center                | 1           | 6.25 |
| Renmin University of China, Beijing, China | 1           | 6.25 |
| The University of Auckland                 | 1           | 6.25 |
| Universita della Svizzera italiana         | 1           | 6.25 |
| Universities of St. Gallen                 | 1           | 6.25 |
| VU University Amsterdam                    | 4           | 25   |

The detailed data of institutions produced paper is listed on table 4. It can be seen that each university produced one paper each.

Table 4: List of Institution

| Institutions                       | # of papers | %    |
|------------------------------------|-------------|------|
| A.T. Kearney                       | 1           | 6.25 |
| Beihang University, Beijing, China | 1           | 6.25 |

Trust on crowdworking has been widely discussed over the past five years (2015, 2016, 2017, 2018, 2019, and 2020). There are 2 papers published on 2017, 2 papers published on 2018, 1 paper published on 2015, 1 paper published on 2016, 1 paper published on 2020.

According to 8 papers found in Selected Studies, there are 11 components and 38 indicators related to trust model on crowdwork platform. Reciprocal voting is described by project participation, project submitted, social ties, votes provided, votes received, worker's participation, worker's solution, and project duration. Open communication is described by community building, level of interaction, topics of interaction, purposes of interaction. Online testimonial is described by vividness, emotional absorption, and message-value congruency. Monetary reward is described by return of submission, submission, and financially rewarded. Cognitive effort is described by difficulty of understanding requirement, effort into understanding requirement, time and effort of task solving, time needed to solve problem. Loss of knowledge power is described by unique value, power base, respect to others, and unique knowledge. Initiating trust is described by escrow services, feedback system, and accreditation system. Augmenting trust is described by requirement analysis services and contract formation services.

Maintaining trust is described by periodical evaluation and harmonious conflict resolution. User reputation is described by author reputation and stereotype reputation. Trustworthiness

reputation is described by evidence prior performance, stereotype reputation, and user reputation. The details of indicator for each component can be seen on table 5.

Table 5: Component, Definition, and Indicator of Crowdwork Systems

| Component          | Definition  | Indicator                               |
|--------------------|---|---|
| Reciprocal Voting  | Based on cooperation and social influence theory, peer voting to competitive online environment (such as crowdwork/crowdsorce system) may trigger cooperation among stakeholders through reciprocal voting. Cooperation may happen in competitions if there are two persons who meet and interact repeatedly [28, 29]. Reciprocity is a kind of cooperation in competition [30,31]. The objective of reciprocal voting used to vote ideas/solution in online system is to prevent social bias. The company can ignore that motive and allow vote to affect innovation process [32,33]. The better the result of screening innovation process, the more successful will get in innovation process [34, 35, 36]. So, the conception and knowledge for social bias in online system (such as crowdwork or crowdsorce system) is very critical for open innovation. | Project Participation                   |
|                    |   | Project Submitted                       |
|                    |   | Social Ties                             |
|                    |   | Votes Provided                          |
|                    |   | Votes Received                          |
|                    |   | Worker's Participation                  |
|                    |   | Worker's Solution                       |
| Project Duration   |   |   |
| Open Communication | Management should provide open communication to make interaction decentralized. But, it will impact to critical comments. Management may choose to take preventive action (such as control to irresponsible autonomy). The persuasive effect of testimonials is based on heuristic thinking and cognitive shortcuts (availability and representative heuristics). [37,38]   | Community Building                      |
|                    |   | Level of Interaction                    |
|                    |   | Topics of Interaction                   |
| Online Testimonial | Testimonial includes description of personal experience or opinion. Some studies found that testimonials are more persuasive than factual information, but other studies found conversely. Testimonials are very efficient in public media because individual don't engage in extensive cognitive processing of media messages. [39,40,41,42]   | Purposes of Interaction                 |
|                    |   | Vividness                               |
| Monetary Reward    | Monetary reward includes on extrinsic motivation. It is provided as an incentive for crowdworker [43]. Crowdworker can expect reward for solution they give to job provider [44]. Monetary reward is the important factor for crowdworker to undertake the action in crowdwork system [45,46].Terwiesch and Xu did research on TaskCNPlatform [47]. They suggest that monetary reward will stimulate participation of crowdworker on platform. Based on social exchange theory, expectation of monetary reward should motivate crowdworker to choose to act [48,49,50].   | Emotional Absorption                    |
|                    |   | Message-value congruency                |
|                    |   | Return of Submission                    |
| Cognitive Effort   | Cognitive effort is mandatory for problem solving on crowdworking platform. Cognitive effort will take part as a medium for solving the gap between past solution/knowledge and current problem. It's costly and will connect the expertise to the problem and develop solution for that problem. Crowdworker must leverage cognitive effort to identify, understand the requirement/problem, and propose the solution [51]. Crowdworkers are not likely to participate when they perceive high cognitive effort is needed for that participation. Crowdworkers expect the crowdwork platform can reduce cognitive effort, so it can build crowdworker's trust to platform. For example, platform must give feedback to the crowdworker if their solutions are not adapted [52,53]. By providing past solution, cognition effort will be reduced [54,55].       | Submission                              |
|                    |   | Financially Rewarded                    |
|                    |   | Difficulty of Understanding Requirement |
|                    |   | Effort Into Understanding Requirement   |
|                    |   | Time and Effort of Task Solving         |
|                    |   | Time Needed to Solve Problem            |



| Component                  | Definition   | Indicator                      |
|----------------------------|--|--------------------------------|
| Loss of Knowledge Power    | Loss of knowledge power is a barrier to knowledge sharing. In crowdwork platform, knowledge is a source of power by crowdworkers. Crowdworker have fear feeling when the job provider know their ideas or solution before they have rewarded. Job provider act opportunistically and not pay the crowdworker once they get the solution. It will impact trust crowdworkers on job provider and they are not participating in crowdwork platform [56]. Crowdworkers also may have feeling that crowdwork platform will misuse their solution and it also impact to crowdworker's trust to platform [57,58]. | Unique Value                   |
|                            |  | Power Base                     |
|                            |  | Respect to Others              |
|                            |  | Unique Knowledge               |
| Initiating                 | In initiating trust, job provider get list of crowdworker and select one of them to work with. There are many concerns related to initiating trust, such as crowdwork opportunistic behaviors (for example crowdworker get monetary reward without properly delivering the solution), crowdworker can't fulfill job provider's requirement [57,58].  | Escrow Services                |
|                            |  | Feedback System                |
|                            |  | Accreditation System           |
| Augmenting                 | In augmenting trust, job provider negotiates with selected crowdworker about deliverables and prices of contract. The solution must be met with job provider's requirement. The requirements are often not fixed and unclear. Several job provider said that the result of task that needed identify requirement usually less predictable and not meet job provider's expectation [57,58].   | Requirement Analysis Services  |
|                            |  | Contract Formation Services    |
| Maintaining                | In maintaining trust, job provider feel uncertainty about commitment and project status progress. Young crowdworkers have enthusiasm and creativity, but they ignore professionalism. Job provider also have concern about crowdworkers commitment (especially during implementation phase) [57,58].   | Periodical Evaluation          |
|                            |  | Harmonious Conflict Resolution |
| User Reputation            | User reputation is asset in social live that plays fundamental role to build online ecosystem, reputation can be used to increase recommendation in a system. [59, 60]   | Author Reputation              |
|                            |  | Stereotype Reputation          |
| Trustworthiness Estimation | Trust estimation is procedure that the trust level for an artifact based on a combination of the reputation of the user who created the artifact and of the provenance stereotype to which the artifact belongs. Trust estimation also a procedure that to determines whether artifact is acceptable based on supplied test entries and background information. This is a form of probability to make decision ahead [59, 60].   | Evidence Prior Performance     |
|                            |  | Stereotype Reputation          |
|                            |  | User Reputation                |

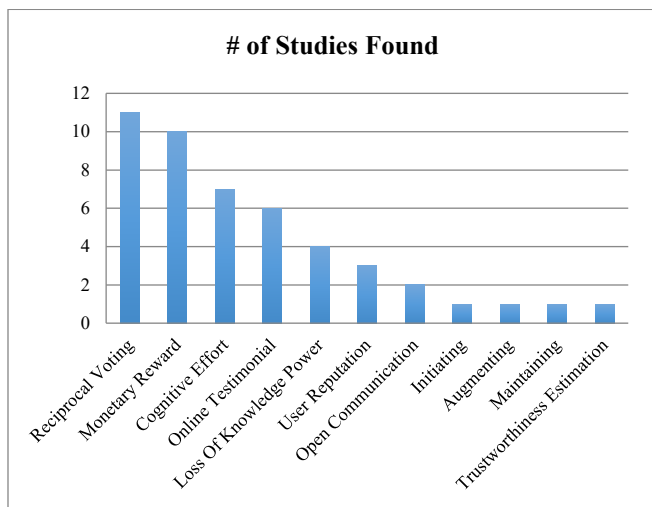


Figure 2: Relationship Between Number of Studies Found and Components  
Source : Processed by the Author

Figure 2 describes the number of studies found from literature study. The top three most discussed components from the study are Reciprocal Voting, Monetary Reward, and Cognitive Effort.

## 5. Implication

This research has an impact on both academic and practice. Academically, the results of this study can be used as a reference for researchers who are concerned with crowdworking or crowdsourcing. There are 11 components and 38 indicators as result of the research can be used for those who are concern with trust component to develop a crowdwork system model. Practically, the company must pay good attention to these 11 components and 38 indicators, if they want to use crowdwork systems. The crowdwork platform must have a good technology aspect, clean and clear procedure about the system (from initiating, augmenting, and maintaining process), stakeholder voting, and reward procedure about the effort that provided by the crowdworker.

## 6. Conclusion & Future Research

Trust is critical factor to those who want implement crowdwork system. There are 11 components and 38 indicators of trust in crowdwork system as research result. This research will help the academic and practitioner related to crowdwork system. Stakeholders need to pay attention to these components and

indicators if they want to use crowdwork system, especially on reciprocal voting, monetary reward, and cognitive effort, since they are the most discussed component from literature study. The platform should allow the job provider and worker to do clean and clear reciprocal voting (more objective assessment) as well as monetary reward procedure. The platform also should provide the features that can minimize cognitive effort to use the platform. By doing so, the issue of trust stated on introduction (unfair assessment and lack of transparency) can be overcome.

The resulting components will be processed using quantitative methods (questionnaires) to be used as the basis for making trust system for crowdwork platform.

### Conflict of Interest

The authors declare no conflict of interest during the research process.

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